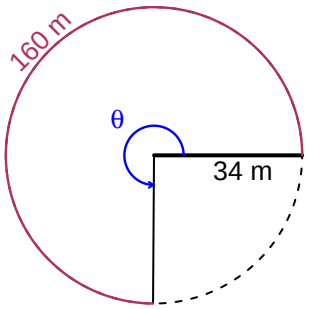
Name: Date:

Trig Final (SLTN v616)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 34 meters. The arc length is 160 meters. What is the angle measure in radians?

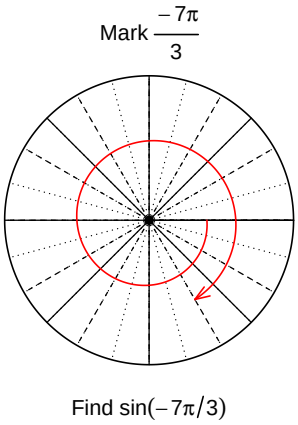


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

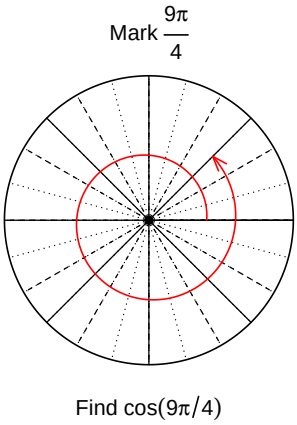
$\theta = 4.706$ radians.

Question 2

Consider angles $\frac{-7\pi}{3}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-7\pi}{3}\right)$ and $\cos\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(-7\pi/3)$



Find $\cos(9\pi/4)$

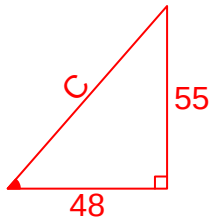
$\sin(-7\pi/3) = \frac{-\sqrt{3}}{2}$

$\cos(9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{55}{48}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.

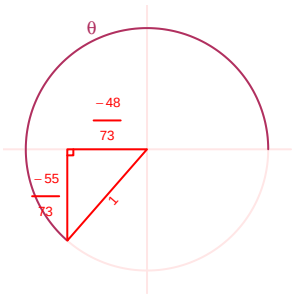
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$48^2 + 55^2 = C^2$$
$$C = \sqrt{48^2 + 55^2}$$
$$C = 73$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-55}{73}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 5.46$ meters, an amplitude of 7.61 meters, and a frequency of 8.82 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.61\sin(2\pi 8.82t) + 5.46$$

or

$$y = 7.61\sin(17.64\pi t) + 5.46$$

or

$$y = 7.61\sin(55.42t) + 5.46$$